

CLAIMS

What is claimed is:

1. A monolithic multi-focal length refractive element comprising:
5 a single monolithic optical element blank comprising:
a first surface region having a first characteristic radius of curvature;
and
a second surface region having a second characteristic radius of
curvature.
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2. The monolithic multi-focal length refractive element as recited in Claim
1, wherein the value of an optical property for said first surface region is different
from a value of said optical property for said second surface region.
- 15 3. The monolithic multi-focal length refractive element as recited in Claim
2 wherein said optical element blank comprises silica (SiO_2).
4. The monolithic multi-focal length refractive element as recited in Claim
2 wherein said optical element blank comprises gallium arsenide (GaAs).
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5. The monolithic multi-focal length refractive element as recited in Claim

1 wherein said monolithic multi-focal length refractive element has a maximum
dimension of less than five millimeters.

6. The monolithic multi-focal length refractive element as recited in Claim
5 1, wherein said monolithic optical element blank comprises a third surface region
having a third characteristic radius of curvature.

7. A method for making a multi-focal length refractive element, said
method comprising:
10 forming in an optical element blank a first surface region characterized by a
first radius of curvature;
forming on said optical element blank a second surface region characterized by
a second radius of curvature.

15 8. The method as recited in Claim 7 wherein said forming said first
surface region comprises etching said optical element blank using a first etch process
having a first etch selectivity.

9. The method as recited in Claim 8 wherein said forming said second
20 surface region comprises etching said optical element blank using a second etch
process having a second etch selectivity.

10. The method as recited in Claim 9 wherein said first etch selectivity is less than said second etch selectivity.

11. The method as recited in Claim 7 additionally comprising forming a first shape transfer mask and etching said first shape transfer mask using a first etch process.

12. The method as recited in Claim 11 additionally comprising etching said first shape transfer mask using a second etch process.

13. The method as recited in Claim 13 additionally comprising forming a second shape transfer mask.

14. The method as recited in Claim 13 additionally comprising using a second etch process to etch said second shape transfer mask.

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15. A method for fabricating a multi-focal length refractive lens, said method comprising:

forming a mask element on a surface of an optical element blank;

heating said mask element to flow said mask element into a shape transfer

20 mask;

transferring the shape of said shape transfer mask to said optical element blank

by using a first etch process and a second etch process, wherein an etch selectivity of said first etch process is different from an etch selectivity of said second etch process.

16. The method as recited in Claim 15 wherein said mask element
5 comprises an organic polymer material.

17. The method as recited in Claim 15 wherein said mask element
comprises a photosensitive material.

18. The method as recited in Claim 15 wherein said optical element blank
10 comprises silica (SiO_2).

19. The method as recited in Claim 15 wherein said optical element blank
comprises gallium arsenide (GaAs).

20. The method as recited in Claim 15 wherein said mask element
15 comprises photoresist.

21. The method as recited in Claim 15 wherein said first etch selectivity is
less than said second etch selectivity.

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22. The method as recited in Claim 15 wherein said etching comprises dry chemical etching.

23. The method as recited in Claim 15 additionally comprising forming said mask element using photolithography.